Medical
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THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

JANUARY, 1930

COMMUNICATIONS

SOME OBSERVATIONS ON THE CAUSES AND TREATMENT OF SIMPLE DETACHMENT OF THE RETINA

BY

H. B. STALLARD

LONDON

THIS paper presents some observations made on the history, physical signs, treatment, and subsequent progress of 100 patients suffering from simple detachment of the retina. Fifteen of these patients attended St. Bartholomew's Hospital between 1923 and 1927, and information concerning the remainder has been obtained from reliable case notes taken by English, American, and various continental ophthalmic surgeons.

Simple detachment of the retina is a line of cleavage formed between the layer of pigment epithelium and the percipient neural portion, over a part or whole of the retina. The intervening space between these layers is filled with a fluid, the nature of which is either physiological or pathological.

Aetiology

Two theories are held concerning the cause of simple detachment of the retina; they are the "mechanical theory" and the "diffusion theory."

The mechanical theory maintains that simple detachment of the retina takes place under one or several of the following conditions:

(*a*) When the intra-ocular pressure in front of the retina falls below the normal.

(*b*) When the pressure behind the retina is increased.

(*c*) When adhesions between the vitreous and the retina contract and pull on it.

Under normal conditions the retina is attached at the papilla and at the ora serrata, the remaining part lies in contact with the choroid, but is not attached to it. Elastic tissue is present in the sclera and choroid, but absent in the retina. In myopia the antero-posterior diameter of the globe increases, the intra-ocular pressure falls, and the retina being an inelastic structure may become detached at a point between the papilla and the ora serrata. The intra-ocular pressure falls when the output of aqueous humour is defective. This defect is due to an interference with the normal activity of the ciliary processes, either from inflammation of the uveal tract, or from atrophy of the circular ciliary muscle and ciliary processes in myopes.

Primary degeneration of the vitreous, perforating wounds of the globe, and perforating corneal ulcers, by lowering the intra-ocular tension, dispose to retinal detachment. A subretinal haemorrhage arising from a contusion of the globe, and exudates in patients suffering from choroido-retinitis, may produce sufficient local pressure to cause a detachment.

Leber and Nordenson have worked on the vitreous of animals, and have discovered that disease of the choroid or ciliary body produces changes in the vitreous. The fibrillae of the vitreous become thickened and tortuous, and the cell content increases. The vitreous shrinks and becomes detached. The detachment is funnel-shaped; the neck of the funnel is at the papilla and the wide part at the equator; and the space between the hyaloid membrane and the retina is filled with fluid. Further dragging on the retina causes the retina to tear. Fluid from the vitreous then enters the tear and floats up the retina.

The diffusion theory is based on the presumption that the retina acts like the animal membrane of a dialyser. The retina separates two physiological fluids; the fluid in the tissue spaces and lymphatics of the choroid possesses colloidal properties, whereas the vitreous is crystalloid in nature. The supporters of this theory believe that the smaller crystalloid molecules can pass through the retina by a process of diffusion.

Oliver[20] has analysed the vitreous and found that 98·4-98·6 per cent. is water, and the remainder is composed of salts, extractives, and a trace of protein and nucleoprotein. Scherl[26] estimated the albumen content of a transudate in acute choroiditis as 8·99 per cent., a figure about twice as high as the normal albumen content

of the fluid in the lymphatic vessels. Halliburton[14] confirms this fact when he states that " the fluid effused from a serous membrane in cases of inflammation contains a higher percentage of proteid material than fluid effused as a result of pressure under normal physiological circumstances." A transudate from blood vessels is very rich in proteins, and these upset the normal balance of osmotic pressure in the lymph spaces. Scherl[26] describes a specimen of subretinal fluid, collected from a patient in whom no retinal tear was discovered. The report states that the colour of the fluid is greenish-yellow and the specific gravity and albumen content higher than in serous effusions. These facts suggest that in composition the subretinal fluid does not resemble the vitreous. Nordenson, however, believes that vitreous enters the subretinal space through a tear in the retina. He has examined 119 patients suffering from simple detachment of the retina and has seen retinal tears in 38 per cent.

The following is a summary of the causes of simple detachment of the retina :—

(1) *Trauma.* Concussion of the globe, subretinal haemorrhage, perforating injuries, perforating corneal ulcers, and occasionally operative procedures on myopes, cause retinal detachment.

(2 *Progressive myopia* is accompanied by softening of the sclera, and compression of the globe by the extra-ocular muscles; the shape and length of the eye is altered, and the retina is subjected to abnormal stresses, culminating in detachment.

(3) *Inflammation.* Irido-choroiditis, panophthalmitis, and retinitis by producing exudates and changes in the vitreous may cause detachment of the retina. Hann[13] and Knaggs[16] have described two cases of bilateral retinal detachment occurring in patients suffering from albuminuric retinitis during pregnancy. Recovery was complete in both patients. Adamuk, Benedict, and Mussey[1] have also recorded similar cases which recovered after the termination of labour.

(4) *Congenital detachment of the retina.* Fernandez[11] has seen bilateral detachment of the retina in two brothers; the detachments were present at birth and persisted afterwards. He suggests that congenital syphilis is a cause of this condition, but he was unable to make investigations in this particular case.

George S. Lachman[17] has reported a case of bilateral retinal haemorrhage causing detachment in a new born child. At the age of three months it was supposed that the child was suffering from retinal neoplasms in both eyes. Both eyes were enucleated, and on examination the retina was found to be separated from the choroid by a mass of blood serum. There was no evidence of tumour

formation. J. Komoto[15] has described 3 cases of retinal detachment associated with coloboma of the iris and choroid, in one family.

Mrs. O.
Right eye.
Microphthalmos and coloboma of the iris and choroid.

1st child	2nd child	3rd child
Male	Male	Female
Right eye. Microphthalmos, coloboma of the iris and choroid. Hare-lip.	Normal.	Both eyes microph-thalmos

Dr. Komoto points out the hereditary influence in these patients, and insists that such people should not marry owing to the danger of transmitting this ruinous condition to posterity.

(5) *Parasitic,* due to cysticercus.

(6) *Idiopathic.* Czerny[8] found that continuous concentration of the solar rays upon the retina of frogs, birds, and certain mammals caused a disintegration of the retinal pigment epithelium. The layer of rods and cones becomes separated from the pigment epithelium. Streams of leucocytes appear among the débris of the broken retinal elements and thereby augment the subretinal fluid. Czerny submits this as a possible cause where no other can be found.

An analysis of the 100 case reports shows the following points of interest.

(i) *Age incidence.*

10—20 years of age	2 cases.
20—30 ,, ,, ,,	20 ,,
30—40 ,, ,, ,,	16 ,,
40—50 ,, ,, ,,	20 ,,
50—60 ,, ,, ,,	27 ,,
60—70 ,, ,, ,,	13 ,,
over 70 ,, ,, ,,	1 ,,

In one patient, the age was not recorded.)

(ii) *Sex incidence.*

Males 62 per cent.
Females 36 per cent.

(iii) *Onset of the detachment.*

Sudden in 52 per cent.
Insidious in 42 per cent.
History of trauma in 16 per cent.
Previous eye trouble in 24 per cent.

(iv) *Refractive errors.*

Myopia 42 per cent.
Hypermetropia 11 per cent.
Emmetropia 11 per cent.
(The refractions of the remaining cases were unrecorded.)

(v) *Intra-ocular tension.*

Raised above the normal in 5 per cent.
Below the normal in 8 per cent.

(vi) The *lens* was hazy, or showed central and peripheral opacities in 20 per cent.

(vii) *Vitreous opacities* were present in 47 per cent;
Retino-hyaloid adhesions in 1 per cent;
Gross pathological changes in 6 per cent.

(viii) *Site of detachment.*

Upper half of retina in 8 per cent.
Lower half of retina in 32 per cent.
Total detachment in 9 per cent.
Detachment in supero-temporal quadrant in 13 per cent.
Detachment in infero-temporal quadrant in 25 per cent.
Detachment in supero-nasal quadrant in 3 per cent.
Detachment in infero-nasal quadrant in 10 per cent.

(ix) Retinitis was present in 3 per cent.

(x) The choroid was diseased in 28 per cent.

I have omitted to mention the incidence of occupation in retinal detachment. This is because the majority of the patients, concerning whom these statistics have been made, belong to the hospital class. Detachment of the retina is said to be more prevalent among sedentary workers who are exposed to eyestrain, *i.e.*, students, writers, and compositors. The statistics given by Poncet[22] in his report to the Ophthalmological Society of Paris on May 3, 1897, closely resemble these.

(i) *Age incidence.* The numbers increase between 40 and 70 years of age, the maximum is at 60.

(ii) *Sex.* Males 62 per cent. Females 38 per cent.

(iii) *Refractive errors.* Myopia 37 per cent.

(iv) *Other causes*:

Choroiditis 16 per cent.
Trauma 19 per cent.
Various 28 per cent.

Treatment of Simple Detachment of the Retina

General principles of treatment.—At the present time the therapeutic measures adopted in the treatment of this condition are regarded with almost universal scepticism, so that detachment of the retina, both to the laity and the medical profession, maintains its unenviable reputation of being incurable. Complete re-position of the detached portion of the retina, and restoration of function in this part is the aim and object of treatment. Re-position of the retina to the pigment epithelium is recognised by the return of a uniform red reflex, the disappearance of the characteristic fundus changes, and the restoration of the visual acuity and the visual field to the normal. It may be partial or complete.

The collection of subretinal fluid separating the detached retina from the pigment epithelium is one of the principal factors preventing the co-aptation of these two layers. The choroid exercises very feeble absorptive powers compared with other vascular membranes, so that the subretinal fluid is absorbed very slowly, and in some cases not at all. Meanwhile the detached part of the retina undergoes degenerative changes, and becomes converted into a fibrous structure covered with albuminous droplets, and incapable of functional restoration. Meyer Weiner[34] believes that the retinal blood vessels exert a contractile force and thereby prevent re-position of the detached part. Retino-hyaloid adhesions may also prevent the detached part from re-assuming its normal position.

The fundamental principle of treatment is to cause co-aptation of the detached retina and the choroid by establishing drainage of the subretinal fluid, and if necessary, by dividing any fibrous tissue bands between the vitreous and the retina.

There are two methods generally adopted for the purpose of draining the subretinal fluid:

(1) To increase the absorptive and excretory powers of the body by the administration of diaphoretics and diuretics, *e.g.*, hot air baths, purgatives, injections of pilocarpine, salicylates, and the local injection of hypertonic saline solutions into Tenon's capsule.

(2) Operative procedures such as scleral puncture, scleral trephine, and scleral puncture with permanent drainage by the introduction of horse-hair or gold wire.

To induce cohesion between the retina and the choroid attempts have been made to set up inflammation by applying a cautery to the sclera over the site of the detachment, or puncturing the

detached portion of the retina in several places, or by electrolysis, and by the injection of iodine in glycerine into the subretinal space.

I propose to describe the treatment of the simple detachment of the retina under the following headings:—

(1) Prophylactic.
(2) Conservative.
(3) Operative.

(1) *Prophylactic treatment* is directed towards the prevention of progressive myopia, and the onset of irido-cyclitis. Nordenson has collected statistics from various observers and has stated that out of 1,100 cases of spontaneous detachment of the retina 80 per cent. were myopes, and 50 per cent. of these were over the age of 50. In progressive myopia the globe lengthens and the vitreous liquefies and shrinks. In such cases the refractive error should be corrected fully. Young persons must wear the full correction constantly, and elderly persons the full correction for distance, with an adequate deduction for near work. In order to avoid excessive convergence near work must not be brought closer than 33 cms. Over-action of the internal recti during convergence compresses the sclera and thereby lengthens the globe. Particular attention must be paid to the following points in ophthalmic hygiene.

(i) The source of illumination must be placed behind and to the left of the patient, and must be of adequate intensity.

(ii) Reading and writing must be reduced to the minimum amount possible.

(iii) Close work must be engaged in for short periods only.

(iv) Recreation of a gentle nature is recommended, but games which are likely to cause jolts, blows, or excessive muscular strain are forbidden.

The error of refraction must be corrected and the patient's general health supported.

(2) *Conservative treatment.* Some general indications for guidance are necessary before deciding on the course of treatment suitable for each particular case. The aetiology and the condition of the vitreous, retina, and choroid play an important rôle in this decision. Patients who show certain pathological phenomena are, in my opinion, better treated on conservative lines. These are as follows:—

(i) Those patients who show gross pathological changes in the vitreous, *i.e.*, numerous contractile bands, vascular membranes, large haemorrhages.

(ii) Patients suffering from retinitis and choroiditis.

(iii) Patients who have retinal tears, and those in whom the intra-ocular tension is very low.

(iv) All recent cases of retinal detachment should be treated on conservative lines for 2—3 weeks as a preliminary to operative treatment.

It is essential to begin treatment early. If treatment is delayed the retina degenerates and restoration of function becomes improbable. The essentials of conservative treatment are:—

(*a*) *Absolute rest in bed.* The position in which the head is placed varies with the site of detachment, *i.e.*, if the detachment is in the region of the posterior pole the head must be immobilised in the horizontal position; if at the periphery and in the lower half of the retina, the head must be raised to the requisite angle. The patient must be fed, washed and nursed without moving his head. The bowels must be carefully regulated, and any physical exertion avoided. Any tendency to cough or sneeze must be checked, if necessary, by sedatives.

(*b*) *Therapeutics.* To promote absorption of the subretinal fluid and to stimulate the excretory organs, hot air baths, saline purges, injections of pilocarpine hydro-chlorate, iodides, and salicylates are administered in suitable doses.

Pilocarpine hydrochlorate is given hypodermically in 0·125 gr. to 0·5 gr. once daily. Certain patients cannot tolerate this drug, since in them it produces vomiting, prostration, and cardiac failure. It must therefore be used with caution. Iodides in the form of potassium iodide gr. v—x are administered thrice daily combined with liq. hydrarg. perchlor. de Schweinitz favours sodium salicylate gr. x—xx four hourly. Conservative treatment must be carried out for four to six weeks before the patient is allowed to sit up in a chair and gradually resume activities of a gentle nature. In spite of careful treatment, a large number of cases, varying from 25—35 per cent. become worse or recur.

(3) *Operative treatment. The surgical history of simple detachment of the retina.*

1860—70. Ware and Sichel were the first to suggest scleral puncture and the evacuation of the subretinal fluid. Kittle of Vienna was the next to pursue this practice. A little later Sir William Bowman, von Graefe, Alt, and Secondi performed the operation of discission of the detached portion of the retina, to allow the subretinal fluid to flow into the vitreous. This operation was soon abandoned owing to lack of success. de Wecker and Masselon then introduced the operation of scleral puncture at the site of detachment, and passed a gold wire drain into the subretinal space. This operation was a failure and was quickly abandoned.

1872. Shortly after this Wolfe and Snell[29] performed meridional sclerotomy, puncturing the sclera in two places, and the detached part of the retina in several places.

1890—95. de Wecker and Chevallereau applied a cautery to the sclera at the site of the detachment. About this time Schoëler recommended the injection of a solution of iodine in glycerine into the sub-retinal space. The results of this practice were disastrous and it has been abandoned.

1891. Deutschmann divided cicatricial bands in the vitreous and at the same time injected the vitreous of rabbits in order to increase the bulk of the patient's vitreous. A little later Birch-Hirschfeld modified this operation by aspirating the subretinal fluid, then puncturing the detached part of the retina and injecting the aspirated fluid into the vitreous. A severe inflammatory reaction followed these procedures, and owing to the rapid absorption of the injected fluids, the vitreous returned to its previous bulk in the course of a few hours. The vitreous seldom adheres to the retina by a single band, but more often a dense cicatricial mass and multiple adhesions are found. The operation of division of one band (should one alone exist) is beset with many difficulties. It is essential to operate under ophthalmoscopic examination, and the technical difficulty of controlling the knife and at the same time obtaining a clear view through media already diseased, is obvious. Also in attempting to sever the fibrous band the retina is dragged upon and the detachment thereby rendered more extensive.

1897. Coppez[6] performed iridectomy, according to the modified operation of Wolfe. Out of 18 patients so treated, one was cured, in five the result was disastrous, and the remainder were partially successful. Scleral trephining has been practised by several English and American ophthalmic surgeons. The sclera is trephined over the site of the detachment, the choroid exposed, and the subretinal fluid evacuated. The trephine hole is left as a permanent drain. Unfortunately this opening soon becomes occluded by a mass of fibrous tissue, and drainage then ceases.

Müller's operation of choroidodialysis has been tried by several continental surgeons. The scleral laminae are divided layer by layer down to the choroid and a spatula is introduced between the sclera and the choroid, and made to pass in an oblique direction, finally it punctures the choroid at the site of retinal detachment, and is then withdrawn. I have been unable to obtain any information concerning the results of this procedure. Müller has also practised resection of the sclera to diminish the size of the globe, and to lower the tension of the choroid in cases of myopia. The technique of this operation is as follows:—An incision about 20 mm. long is made above the insertion of the external rectus

muscle. Two sutures are passed into the external rectus and the muscle divided between them. The superficial layers of a band of sclera 20 mm. × 10 mm. from the insertion of the external rectus muscle to the equator, are dissected away. Five sutures are then passed through the edges of this strip and retracted whilst the deeper layers of the sclera are separated from the choroid. The scleral sutures are then tied.

1896. *Electrolysis* was tried by Montgomery, Snell, Terson, Motais, and others. The sclera was punctured by a platino-iridium needle and this needle was pushed through the sclera and on into the subretinal space. A current of five milli-ampères was passed for one minute. The operation is very painful and the post-operative reaction intense. The results are not satisfactory. Montgomery[19] has reported on four cases, three of which showed no improvement, and one became worse. In two of these cases the pathological changes in the vitreous increased, and in one case the vision was lost entirely. Snell[30] treated three patients, one recovered, one improved, and the other showed no improvement. Terson reports on twelve cases, one recovered but the recovery lasted for nine months only; five were improved for 2—9 months, but subsequently became worse; and of the remaining six no account is given. Motais states that in the eleven cases which he treated, there were three ameliorations, and two cures, but no account is given of the six other cases.

Subconjunctival injection of hypertonic saline. Of recent years attention has been turned towards the treatment of detachment of the retina by the injection of hypertonic saline under the conjunctiva or into Tenon's capsule over the site of the detachment. The object of this procedure is to drain subretinal fluids by osmosis; the choroid and sclera are assumed to act as dialysing membranes. In my opinion this hypothesis is fallacious. First, the subretinal fluid possesses a high albumen content, and is therefore of a colloidal nature, whereas the injected saline is a crystalloid solution. This being the case, the larger colloid molecules will not pass by osmosis through the choroid and sclera to reach Tenon's capsule. Secondly, the thickness and the dense fibro-elastic structure of the sclera will afford mechanical difficulties to the passage of molecules between the two fluids. Even if we assume that water passes from the subretinal fluid through the vascular layers of the choroid and then through the sclera to reach the crystalloid solution injected into Tenon's capsule, it is probable that this resulting loss in the volume of the subretinal fluid would be only temporary, for lymph or aqueous would pass into it again either from the choroid or vitreous, or both. It is likely that the injected saline is absorbed by the blood vessels and lymphatics draining Tenon's capsule and the surrounding soft orbital tissues.

de Wecker has injected a mixture of gelatin 3·5 parts and physiological saline 100 parts.

de Schweinitz has reported a few favourable results by injecting 0·5 to 1·9 c.cs. of saline 4—5 per cent. after puncture.

A. Darier[9] has treated cases of detachment of the retina in myopes by subconjunctival injection of acoinated gelatinized serum and saline. If there is no improvement after two injections he advises scleral puncture.

At St. Bartholomew's Hospital between 1923 and 1927 twelve patients were treated by injecting a sterile solution of sodium chloride 5 per cent. alternately with sodium citrate 5 per cent.; novocaine 2 per cent. was added to both solutions. Every third day five to ten minims of these solutions were injected into Tenon's capsule over the site of the detachment. The injection of these solutions did not provoke any reaction, but the results of this treatment were far from satisfactory. Of the twelve patients treated at St. Bartholomew's Hospital only one was improved, the remaining eleven showed no improvement at all. In one patient the pathological changes in the vitreous increased, and in another the lens became opaque.

1923. Further attempts were made to improve the technique of scleral puncture. Hitherto the majority of ophthalmic surgeons, when performing this operation, used to plunge a Graefe knife through the sclera at the equator of the globe, and over the site of the detachment, give the knife a quarter or half turn, pause a second to allow the subretinal fluid to drain, and then withdraw the knife and apply a pad or bandage. Several surgeons have performed double scleral puncture by passing the knife into the subretinal space, then turning it back through the choroid and transfixing the sclera again at a point about 10 mm. from the site of the initial puncture. The knife was then withdrawn. G. Sourdville[30] advises multiple scleral puncture. A Graefe knife is entered at the equator of the globe and plunged 10—12 mm. towards the centre of the eyeball. This is repeated in three or four situations over the detachment, the blade of the knife being rotated to evacuate the subretinal fluid. 1—2 c.mm. of an aqueous solution of mercury cyanide 1/1,000 together with a few drops of 5 per cent. cocaine is injected under the conjunctiva at the site of puncture. Sodium chloride 6 per cent. is injected under the conjunctiva once a week after the post-operative chemosis has subsided. During two and a half years Sourdville has treated 35 eyes in 30 patients. Sixteen of these showed recent detachments, nine of which were cured permanently, and one improved. Out of eighteen patients, in whom the detachment was of long standing, nine were improved.

In 1923 Meyer Weiner[34] performed the operation of posterior sclerotomy with permanent drainage. His technique is as follows:

—Two trephine openings, about 1 mm. apart, are made over the site of the detachment. Two or three strands of horse hair are passed on a curved needle through one trephine opening. The needle is made to pierce the choroid, traverse the sub-retinal space, and to pass through the choroid again and out through the other trephine opening. About 1·5 mm. of horsehair is allowed to project from each trephine hole.

Of six patients so treated, two showed complete re-position of the retina, and four became worse. This treatment is inadequate where vitreous bands are present and where the subretinal space is filled by a dense organizing substance.

September, 1923. Bettremieux[2] described the operation of non-perforating peri-corneal sclerectomy. The object of this operation is to improve the intra-ocular nutrition by making an anastomosis between the subconjunctival peri-corneal vessels and the intra-scleral plexus of veins. Bettremieux maintains that myopic ectasia and anterior choroiditis are due to nutritional disorders of the uveal tract. The technique of this operation is briefly as follows:—Under cocaine anaesthesia a conjunctival flap, 15—18 mm. wide, is dissected from the limbus. The sclera is bared in the region of the limbus, and is shaved so as to make a groove 15 mm. × 1 mm. The conjunctival flap is moulded into the groove, and becomes adherent to it. The operation can be repeated at other parts of the limbus.

1929. At the International Congress of Ophthalmology held in Amsterdam Professor J. Gonin described his method of treating simple detachment of the retina. He emphasized the importance of locating accurately a tear in the retina where such exists. Over the site of the retinal tear he makes a puncture through the sclera and choroid with a thermo-cautery and sears over the hole in the retina, with the object of preventing the passage of vitreous into the subretinal space and of provoking an adhesion between the retina and choroid. The fundus paintings of cases so treated show favourable results which are remarkable. It is obvious that this operation must be fraught with great technical difficulties.

It has been said that the success of any operative procedure is in the inverse ratio to the number of operations described and practised for that particular condition, and the operative treatment of retinal detachment is no exception to this.

Scleral puncture, the application of the galvano-cautery to the sclera, electrolysis, and the injection of hypertonic saline have enjoyed a more prolonged trial than other methods. Deutschmann's operation for dividing cicatricial bands in the vitreous, Schöler's injection of iodine in glycerine, and drainage of the subretinal space by gold wire have been condemned as both useless and dangerous.

In the table given below the results of treatment are classified as being favourable and unfavourable. The cases yielding favourable results have been subdivided into those which recovered completely, and those which improved. Complete re-position of the detachment and full restoration of the visual acuity and visual fields I have regarded as recovery; partial re-position of the retina, and partial restoration of the visual acuity and visual field as improvement. The unfavourable results are subdivided into cases which showed no improvement, and cases which became definitely worse. In the patients who became worse the detachment increased, the visual acuity was diminished or entirely lost, the lens became opaque, and the pathological changes in the vitreous advanced.

(N.B. Certain patients improved for a time, but subsequently the detachment recurred; these have been classified as unimproved and worse.)

Treatment.	No. of cases treated.	Favourable		Unfavourable.	
		Recovered.	Improved.	Unimproved.	Worse.
Conservative treatment ...	35	17%	40%	20%	23%
Scleral puncture	40	17½%	20%	17½%	45%
Hypertonic salines ...	13	—	7½%	92½%	—
Electrolysis	7	14%	14%	57%	14%
Scleral cauterization ...	2	—	—	50%	50%
Scleral puncture and division of vitreous bands	3	—	—	100%	—
Total	100	14%	24%	34%	28%

The statistics regarding the results of treatment by electrolysis, scleral cauterization, and Deutschmann's operation of dividing cicatricial bands in the vitreous are unreliable on account of the small number of cases which I have been able to collect. Of the few described above the results appear to be disastrous.

The results obtained by the injection of hypertonic salines are unsatisfactory. Detachment is liable to recur soon after treatment has ceased, or at a later date. Of the cases reported in the appendix only 38 per cent. have been followed up for a period varying from one to three years after discharge from hospital. It is

probable that many more recurrences and subsequent disasters occur than we know of.

The prognosis is bad for the majority of patients, especially when the affected eye has been previously damaged by disease or injury, or when the detachment has recurred. In myopes the prognosis is worse than in emmetropes and hypermetropes. The prognosis is more favourable in patients where the detachment is associated with albuminuric retinitis of pregnancy, or where the detachment is traumatic in origin, especially if prompt and efficient treatment is carried out early. The effect of conservative and operative treatment on the prognosis varies with the type of case selected for each respective treatment. Patients suffering from albuminuric retinitis of pregnancy with detachment of the retina recover after two or three weeks' conservative treatment. Also some cases of detachment due to trauma will recover after two weeks' conservative treatment, while with others it is necessary to perform scleral puncture in order to obtain a satisfactory result.

Conservative treatment must always be adopted where gross pathological changes are present in the vitreous, retina, or choroid. Operative measures in such cases are frequently disastrous.

It is interesting to compare these results with those of other observers. Leber states that re-attachment of the retina takes place in 8·5 per cent. of cases, and that moderately useful vision is restored in 3—6 per cent. Uhthoff's statistics show that 61 per cent. of cases of retinal detachment are myopes. He has collected 351 cases of permanent re-attachment. 45 per cent. were due to conservative treatment, 24 per cent. to operative treatment, and 31 per cent. recovered spontaneously without any treatment. Darier[9] gives 16·27 per cent. recoveries, and 25·55 per cent. improved by his method of injecting acoinated gelatinized serum under the conjunctiva.

Summary

Treatment:

1. *Early* treatment is most important.
2. Conservative principles must be adopted for two or three weeks. If at the end of this time the retina is not re-attached, operative measures are indicated if the case is suitable for such. Pathological changes in the vitreous and the uveal tract, or a perforating injury, are contra-indications to an operation.
3. All the operative measures adopted for this condition are unsatisfactory, but scleral puncture and drainage of the subretinal fluid afford better results than any of the others.
4. Detachment frequently recurs two or three days after scleral puncture. The operation should be repeated a week or so later.

5. On discharge from hospital the patient must be instructed as regards prophylactic treatment, *i.e.*, he must avoid strenuous exercise, jolts, and blows.

Prognosis:

1. The prognosis is always grave.
2. It is more favourable in patients suffering from detachment due to trauma, without a perforating injury, and in cases of detachment associated with albuminuric retinitis of pregnancy.
3. It is unfavourable in cases where the eye is grossly diseased as a result of an old perforating injury or inflammation, and where there has been a previous detachment.
4. The results of treatment are less favourable in myopes.

My thanks are due to Mr. Foster Moore for permission to publish the cases from St. Bartholomew's Hospital, and for the advice he has kindly given me from time to time.

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DEFECTIVE SIGHT AND SIGHT EDUCATION

BY

KENNETH R. SMITH, M.D.(Lond.)

KEW

STRABISMUS is described in a very well known text book on diseases of the eye under a section entitled " Disorders of Motility of the Eye." The word itself is defined as " a general term applied to all those conditions in which the visual axes assume a position relative to each other different from that required by the physiological conditions." When both eyes are directed to the same object, and are seen to follow it when it moves, it is certain that both eyes see it, and that they are in their true physiological position. Thus the physiological conditions of normal human sight are brought about when both eyes fix the same object. The condition of sight in concomitant strabismus is that only one eye fixes the object looked at, and the other does not fix it. The disorder of motility is, therefore, *the failure of a movement* which should occur under normal conditions, that is, the movement of fixation fails in one eye or in the other.

Further, although the power to see with each eye may exist, and in many cases of concomitant strabismus the sight with each eye separately is good, *the power to see with both eyes at the same time is absent.* This is a matter for observation, not for discussion. Let any child with concomitant strabismus look at an object, a pencil, for example, and ask him how many pencils he sees. His answer is " one." *The eye which sees the pencil, fixes it. The eye which does not fix it, does not see it.* for there is no double vision,

and the conditions which make single vision possible with both eyes do not exist.

The observations are carried a step farther by covering the eye which sees the pencil. The squinting eye in most cases is then seen to fix the object, and the patient sees one pencil as before. The conditions of sight are thus the same when the sound eye is prevented from seeing as when it sees; in either case only one eye sees the pencil, the other eye deviates from its physiological position.

The observations may be completed by means of the binoscope. This apparatus enables most children with concomitant strabismus to see simultaneously with both eyes, and nearly all of them, not only see the object looked at with both eyes, but fix it with both eyes simultaneously, so that binocular vision is brought about, and all signs of strabismus vanish for the time. In some there is a momentary "double vision," which serves to demonstrate the sequence of events, namely, that simultaneous vision of the object with both eyes precedes the fixation of it by both eyes, and in some the diplopia is of longer duration. Now remove the binoscope; simultaneous vision with both eyes ceases, and the deviation, the disorder of motility, is observed as at first.

It is thus clear that in these cases the visual axes assume the position relative to one another required by the physiological conditions, when both eyes are enabled to see simultaneously the same object, and that they cease to maintain the position when the power to see it simultaneously ceases.

When the movement of a particular switch serves to switch on an electric lamp, and again to switch it off, it is certain that the movement of the switch controls the current in the lamp. In these cases of concomitant strabismus simultaneous vision of the object by both eyes causes all signs of the disorder to vanish, and the loss of the simultaneous vision is followed by their reappearance, and there is the same certainty that simultaneous vision of the same object by both eyes controls the disorder. Moreover there is no evidence of any motor defect. The movements of fixation are absent when the afferent stimulus which brings them about is absent, but take place in their natural perfection when the stimulus is present. The disorder is a sensory one. It is a defect of vision, but not of the eyes or of the parts which move them, for each eye may, and often does, perform its normal functions separately from the other. The defect is in the visual centres. Retinal images of an object do not constitute the sensation of it. They may lead to sensation or they may not. We have no proof of subjectivity or modifications of consciousness apart from the action of the cerebral hemispheres. Retinal impressions must reach and induce molecular changes in the cells of the visual centres to excite a visual

sensation, which is the subjective side of activity in these cells. Moreover we do not fix every object in the field of vision. When an object attracts mental attention, then fixation by the eye which sees it follows. When therefore an eye fixes an object, it is certain, not only that the object is seen, but that the sensation of it is associated with the concentration of consciousness which is meant by the word attention, that the sensation of it predominates over those of other objects included in the field of vision. The physical conception of the condition is intensified activity in those cortical cells which are concerned in the sensation of the particular object, with a diminution or, possibly, complete inhibition of activity in others.

In classification concomitant strabismus finds its true place among disorders of the brain, and in that division of them which relates to sensation.

The true sequence of events may be demonstrated by any one who desires to ascertain it. Thousands of operations for squint have failed to restore the physiological conditions of human sight. This almost universal failure shows the utter futility of treatment which ignores their true sequence. The movement of the eye to fix the object seen is a natural response to the stimulus which induces the sensation of it in the eye which sees it, and can be obtained in no other way than by bringing about the sensation. Sensation with both eyes simultaneously similarly brings about fixation by both eyes simultaneously, each by its own sensation.

Fixation of an object by the eye which sees it is an activity of great interest. It is automatic and is observed very early in life. A very young infant will fix a bright object and follow its movements with one eye, as Mr. Worth has observed and recorded, and yet the movement of fixation presents typically *the characteristics of true volitional action*. As such one might describe it: the sensation of the object attracts attention, and awakens the desire to see it with the clearest vision, and the eye is moved so that the retinal image of the object falls on the punctum centrale to attain this clearest vision of it.

The following extract is explanatory of fixation:

"In the lower animals the control and co-ordination of movements are almost complete at birth, or require little education as compared with the prolonged helplessness of the human infant.

"Some birds start from the egg already fully equipped, like Athene from the head of Zeus. They are in a great measure mere 'conscious automata.' They are capable of acquiring sensory experience and association of ideas, but of little further motor acquisition beyond that with which they start in life. Their cortical motor centres count for little, and may be removed without causing much disturbance of their ordinary modes of activity. Rabbits

require but comparatively short education to perfect their powers; cats and dogs longer; but cats and dogs are already advanced in life, and have assumed the cares of paternity, or rather maternity, when the human infant can scarcely lift a finger in its own behalf.

"In proportion as volition predominates over conscious automatism, is education necessary to perfect the powers of movement; in the same proportion are the cortical centres developed; and in that proportion are the powers of movement paralysed by destruction of the motor centres of the hemispheres.

"In man volition is predominant; education is long and laborious; the faculty of special motor acquisition is unlimited; the cortical motor centres reach their highest development; and their removal causes such complete and enduring motor paralysis as to indicate that automatism in and by itself is scarcely detachable from the centres of consciousness and volition." (Ferrier: The Functions of the Brain.)

In the movement of the eye which sees an object to fix it automatism predominates. It is as automatic as those of birds described as conscious automatism, and is a completely organised co-ordinate motor acquisition at birth or very soon after; and the impulse for the attainment of clearest vision, which governs it, is instinctive. Walking has to be learned, speech gradually develops in early education, but fixation of an object by the eye which brings the sensation of it is an acquisition of the more elemental type ready for use without education. Phonation is similarly elemental; an infant can cry; but *the cultivation of this faculty in association with articulation, and the cultivation of fixation with both eyes simultaneously in association with nearly all our activities need education.*

We thus begin life with each eye a separate alternative doorway to our clearest sense of sight. The sensory channel of each is complete, for the one co-ordinated movement which is needed for each eye to respond to the sight of an object by giving the clearest vision of it, is a completely organised sensori-motor acquisition. That is, fixation with each eye in response to its own sensation is as automatic as the movements of young ducks in water, or of young swallows in flight.

From this infantile vision the higher type of adult sight, binocular vision, develops by education. The process of education needs more investigation, but a few facts which bear on the subject may be mentioned.

(1) The field of vision with both eyes is wider than that of either eye alone. Any group of objects which extends completely across the wider field of simultaneous vision with both eyes, cannot be kept in view by one eye only; looking at such a group tends to induce activity in both eyes at the same time. This is the principle

of the binoscope, which demonstrates the truth of the statement. Further, if any object in this group attracts mental attention and is " fixed," it is as a rule fixed by both eyes. Such conditions must present themselves to the growing infant during its hours of wakefulness, and almost certainly begin the natural education of binocular vision.

(2) The acquisition of early purposive co-ordinate movements appears to be closely associated with the development of binocular vision. It is the natural sensory component in nearly all of them, and is the guiding sense of most skilled movements throughout life. The necessary attention is readily concentrated and retained in the process of acquiring co-ordinate movements, and the sense itself is educated in their acquisition. Pears' well known advertisement picture, " He wont be happy till he gets it," is a good illustration of the natural education of binocular vision; the child is training his movements and his sight in the effort to attain the object of his young desires.

(3) The natural education in maintaining binocular vision for near objects appears to belong to a later period of growth. The schoolboy may afford illustrations of it. He may take a clock to pieces to see how it works; or he may collect birds' eggs, butterflies or postage stamps; and the desire to distinguish one from the other retains his attention in examining details, and thus tends to maintain fixation with both eyes indefinitely without conscious effort. This natural tendency to observe and investigate thus apparently initiates another stage in the education of sight, that is, in establishing the physiological conditions of adult vision to replace completely those of infancy in prolonged near vision.

Civilised conditions impose upon children the prolonged use of the eyes in near vision in learning to read and to write before the power to retain binocular vision for near objects has been fully acquired, at a period when instability of the adult type of sight is marked by the liability to strabismus, and no attempt is made to assist the development of the sight to its adult type by education.

(4) The close association of sight with our intellectual life must be mentioned. " We cannot voluntarily concentrate attention on any idea which we cannot represent visually, either in its own characters, source or relations." If intellectual attention is mainly ideal vision, and the paths of activity in the re-presentation of ideation are the same as in the original presentation, that is, in observation, a point upon which physiological teaching and that of Bain and Spencer, on other grounds, are agreed, the accuracy and facility of the re-presentation depend upon the natural use of the eyes in observation, that is, in establishing the coherent association of the sensori-motor acquisition.

Strabismus thus marks a failure in the education of sight. The author above referred to defines heterophoria as latent strabismus. In concomitant strabismus when one eye fixes an object, the other eye does not fix it; this is the constant condition of sight; the failure to educate the sight of infancy to that of adult vision is complete, sight retains its infantile condition. In heterophoria the infantile condition of sight is not a constant one, but the liability that it may occur exists; it may recur and persist just when simultaneous vision with both eyes is most needed.

The failure to educate sight to its normal condition of perfectly spontaneous binocular vision constitutes by far the most common defect of vision. It appears to leave the individual very often less efficient in respect of sight than the complete absence of binocular vision, which is the condition of sight in permanent squint. For in the complete absence of binocular vision there is no effort to maintain it, and there are no symptoms of asthenopia. The characteristic symptom of asthenopia is the constant effort to maintain clearest vision. Effort means fatigue when it is continuous; hence the inability for prolonged close work. Repeated fatigue may lead to a condition of exhaustion and to neurasthenic conditions, as well as to indications of irritation in and about the eyes themselves, which may be completely incapacitating. The condition of sight in concomitant strabismus thus appears in this respect to be a conservative one as compared with the vastly more common condition of incomplete development of normal adult sight.

Moreover, a condition which is capable of bringing about such severe irritative effects appears to be a very unfavourable one for the natural growth and development of the eyes themselves, and is likely to be a powerful factor in the enormous increase in defective vision, which is mainly defective growth and development. The natural environment, whose tendency is to correct in the process of growth what is defective, and to bring the ultimate result nearer to perfection, is in continued natural use.

There is ample evidence that either squint or heterophoria in the parents increases the liability to these defects in the children and that therefore the rapidity with which these defects spread tends ever to increase. The practical consideration of the subject is not therefore one for procrastination.

The facts are simple. Our sense of sight, like most human faculties, needs education, natural or otherwise, for its development to normal adult condition. Binocular vision, as a completely spontaneous function is the object sought by education. This is the most perfect sight and at the same time the most restful. Look through a stereoscope at any good stereoscopic picture. There is no sense of effort; observation becomes a pleasure in the perfection

of the sense, and this is the environment for true evolution. " No profit grows where is no pleasure ta'en," says Shakespeare of education in general. Nearly all our activities depend upon sight, and the adult sight with its marvellous appreciation of space is the only condition of the sense which leads to greatest perfection of the movements in space which depend upon it, that is, in most movements of skill; and its perfect restfulness alone affords the condition best adapted for use in observation and in prolonged near eye-work.

There is abundant evidence that natural education of sight under civilised conditions needs rational help. The words of Ferrier, above quoted, describe the physiological basis of education, by which the human being has a share in his own creation or evolution, less maybe than we think, but enough to make very great the responsibility for failure to provide education when it is obviously needed, and when its attainment is simple.

The facts point clearly to the failure in the power to retain simultaneous vision with both eyes for near eye-work in the early years of life, and as clearly show the necessity for training to attain stability in simultaneous vision with both eyes during these early years. Provided that the natural use of both eyes is thus assured, it appears probable that the ordinary use of them will complete the education.

NOTE ON TRAUMATIC ASPHYXIA WITH OCULAR COMPLICATIONS

BY

J. BRUCE HAMILTON

SENIOR HOUSE SURGEON, ROYAL LONDON OPHTHALMIC HOSPITAL

R. W. R., aged 15 years, was leaving his work at 6 p.m. on September 2, 1929, when he was caught between the door and floor of a lift and his chest was severely compressed for a period of not more than 60 seconds: on this point he is very clear. He was immediately taken to hospital where he was detained two hours and then sent home. On arriving at his home at 8.45 p.m. his mother noticed that his face was swollen and that his eyes were blood-shot, and he was put immediately to bed. Next day there was marked swelling of the neck and face, both eyes were red and the patient was drowsy and could remember nothing of the accident. His eyesight did not appear to be affected. At the end of 7 days his memory had returned: at the end of 9 days all swelling had dis-

appeared: and at the end of 4 weeks his eyes had returned to their normal colour.

On September 13, 1929, I saw the patient for the first time and he had then very extensive, symmetrical, bilateral subconjunctival haemorrhages, but no evidence whatsoever of vascular changes in his fundi. His vision right and left was 6/6.

The one outstanding feature of this case, as compared to similar cases reported, is the surprisingly short duration of the compression of the chest, which resulted in such extensive latent signs. On this question of duration, Foster Moore in his book on Medical Ophthalmology makes the following statement:—"In some instances of traumatic asphyxia from severe compression of the chest of long duration, ocular complications may arise: . . . ."

SOME EARLY ROYAL OCULISTS

BY

R. R. JAMES

LONDON

EARLY last year the plate which is reproduced to illustrate this article was sent to me by Mr. Holmes Spicer, in the hope that I might be able to furnish our readers with some account of Thomas Clarck. It had belonged to Sir Anderson Critchett and was bound in brown paper on which was stamped "Dedication Plates and Records, 1688." I am not learned in prints, but this would appear to be a rather rough wood block, and it will be seen that the name of the engraver is omitted. The first thing to settle was where the plate came from. Mr. H. E. Powell, Librarian of the Royal Society of Medicine, suggested that it was from a *History of the Bible,* by Le Sieur de Royaumont, translated by J. Coughan and J. Raynor, printed for Robert Blome, 2 vols., roy. folio, 1690-98, with 238 plates. An extended research by Mr. Harvey Bloom at the British Museum, Sion College, and the British and Foreign Bible Society, has failed to locate it. Mr. Bloom writes, "It ought to belong to Le Sieur Royaumont's *Histoire* but neither edition contains the Apocrypha. I am inclined to think that plates were prepared for such a purpose but the volume never printed. Blome published no Bible."

I have drawn blank in all the usual books of reference, and in spite of the large amount of negative evidence, have decided to print what I know about three early Royal oculists, namely Thomas Clarck, Thomas Elles or Ellis and Paddington Macqueen.

THOMAS CLARCK

I find a Thomas Clarke, Anglus, in Peacock's Index of English speaking Students who have graduated at Leyden University, under date 31 Martii, 1664. In June, 1656, Thomas Clarke, A.B. (Oxon), was admitted Extra-Licentiate of the College of Physicians (Munk.) According to Foster's *Alumni Oxonienses*, 1st Series, Vol. I, this Thomas Clarke was " 2nd son of Edward Clarke, of Ardington, Berks, militis, Wadham College, matriculated 2 Nov. 1627, aet. 15. B.A., 1629, of Gray's Inn, 1643; called Bachelor of Physic in the Visitation of 1664."

Search in Venn's *Alumni Cantabrigienses* and Musgrave's *Obituary* has yielded nothing; search in histories of St. Andrew's, Holborn, has also proved negative and an extensive search at the Public Record Office has failed to find the warrant of appointment. Mr. Harvey Bloom, who kindly undertook the research, writes: "I have searched the records of the Privy Seal and Signet Office, both the *Docquet Books* and *indices*. I hardly know under which heading an oculist at that date would be placed, whether as surgeon or goldsmith. I fancy these men were not members of the Household, but employed as occasion served. Had they been formally appointed I must have found the warrant under the Privy Seal or Signet." We have no evidence, save for the inscription on the plate, that Clarck was sworn " Phisitian Oculist in ordinary to King Charles ye 2nd and to King James ye 2nd, in whose presence apparently he couched a cataract in a lady 15 years blind and restored her sight in an instant." He (possibly in a fit of remorse) contributed the plate of Tobit's restoration of sight to some work to be published by Blome. Would it be fair to suggest that when the question of paying for the plate arose, Clarck was a defaulter, and so the plate was never published?

It will be seen that a coat of arms appears in the middle of the inscription on the plate. This can be blazoned as follows:— Argent, on a bend gules, between three Ogresses as many swans proper. The crest is a lark, with wings expanded proper, holding in the beak an ear of corn. According to Burke's *Landed Gentry*, this coat is borne by the family of Clark of Bridwell, in Halberton, Co. Devon. Edmonson, *Display of Heraldry*, gives the same coat for the family of Clarke of Northampton, and the same coat, without the crest, is given for Clarke of London. Burke gives the Northampton Clarke a similar coat, but he calls the Ogresses, Torteaux. The difference is that Torteaux means red pellets and Ogresses black pellets.

The visitations of London and Northampton do not help in the matter. It is highly probable that Thomas Clarck, M.D., had no right to bear arms at all, and that he appropriated a Clark coat from some other family.

To Thomas Clarck of S.t
Andrews Holborn M.D. Sworn
Physitian Oculist in Ordinary
to King Charles & K. 2. & to King
James 1 & 2. In whose
presence he restord a La
& 15 years blind to her
sight in an instant he
being eminent & succesfull
in curing all distases incident
to ye Eyes &c. For ye Advancement of this Work contributed this Plate to
whose patronage it is dedicated by Richard Blome.
Tobit chap: XI.

155)

Tobit recovereth his Sight.

UNIV. OF MICH.

THOMAS ELLIS

From the obituary in the *Gentleman's Magazine* for the year 1735 we get the following note. " Feb. 3.; Thos. Elles, aet. 92, oculist to James II and groom of the Chamber, deceased." An identical notice appeared in the *Historical Register* (Chronological Diary), with the exception of the name being spelt Ellis. The *Political State of England* for February, 1735, says that he died at Windsor on February 27.

PADDINGTON MACQUEEN

From the obituary in the *Gentleman's Magazine* for the year 1736 we get: " March 16.; Paddington Macqueen, at Betley, Staffs., late oculist to William III, worth £16,000, deceased." The notice in the *Historical Register* is identical; while the *Political State of England* for March, 1736, gives, " March 9, Died at his Seat in Staffordshire, Paddington Macqueen, Esq., formerly oculist and Groom of the Chamber to the late King." As regards their Royal appointments the same remarks made about Thomas Clarck apply in the case of both Ellis and Macqueen. Mr. Bloom searched for five years in each case in the wills of the P.C.C., those of the Court of the Dean and Chapter of Westminster and the Commissary of London, without result. He says it is most unusual to find no will or admon. in the case of so rich a man as Macqueen. He consulted London newspapers as well as the *Indices* of the Society of Genealogists and found nothing. The name Macqueen does not occur in the volumes of the William Salt Society, the Archaeological Society for Staffordshire, nor in Stebbing Shaw's History of that county. Macqueen was not buried at Betley; some years ago I wrote to the then owner of Betley Hall, who happened to be a girl friend of my mother, and asked her to get the Rector to search the parish registers. This was done and nothing was found. It was suggested that as the name was a Scottish one, Macqueen might have been buried in Scotland. It is possible that Macqueen's will might have been proved at Lichfield, but Mr. Bloom thinks this unlikely as he was so wealthy a man. He tells me that the Lichfield wills are now kept at Birmingham. He has also ascertained that Macqueen's will was not proved in any Probate Court in Scotland; nor is there any record of it at Birmingham. Thomas Ellis, though stated to have died at Windsor, was not buried there. There is no record of the appointment, of either Ellis or Macqueen as Groom of the Chamber, to be found in the warrant books of the Lord Chamberlain's Office for the years 1660-1665 : 1676-1680 : 1685-1688. I think it will be conceded that no stone has been left unturned in the effort to provide facts about these three Royal

oculists. The results of this search are disappointing, but as Mr. Harvey Bloom says:—"There is no period so difficult to trace people in as the late 17th and early 18th centuries."

I have thought it best to record all this negative evidence here in case any ophthalmic surgeon in the future should be tempted to try his hand at these three men, for it will save him much time and trouble knowing the search which has already been made.

ANNOTATIONS

Blindness in India

The Committee of the All-India Blind Relief Association, having its headquarters in Bombay, has sent us a copy of a letter which has been addressed to H. E. The Viceroy of India, together with pamphlets and other literature dealing with blindness in India.

Statistics as to the number of blind in India vary greatly; census returns show 1·5 per thousand for totally blind persons, but the Association has reasons for considering this figure far too low. Thus in 1918-19 in the Nasik district, for which census figures show an incidence of 1·74 *per mille*, an actual count in four talakas in villages with a population of 212,000 showed an incidence of at least 4·38 *per mille*. A few years ago a Deputy Commissioner in the United Provinces had a similar count made and discovered an incidence of no less than 9 *per mille*. In Palinpur an incidence of 7 *per mille* has been noted. The Association has reasons for believing that instead of the half million totally blind persons in India shown in the census returns, the true number is about treble. This refers to those totally blind in both eyes and takes no account of uniocular blindness. The Association, in an analysis of cases attending their camps and dispensaries, has found that for every totally blind person there are three with more or less damaged vision.

The fact that much of this blindness is preventable and that a great deal is remediable is commented on. Industrial accidents are, we believe, very rare in India and the main causes of blindness are cataract, glaucoma, untreated ophthalmia and neglected corneal ulcers. The Association points to the splendid work accomplished in Egypt by the ophthalmic services established, in the first place, through the generosity of Sir Ernest Cassell.

Mr. Charles Henderson, I.C.S., would appear to have been the first to attempt to ameliorate this lamentable state of affairs in India, and now the All-India Blind Relief Association has been formed, with Mr. Henderson as President, in order to attempt

to affiliate the various centres, to consolidate them under one head, and finally to improve and extend the work of blind relief. So far much has been accomplished by what we may call private endeavour, but lack of funds is the main stumbling block. It is obvious that private enterprise and generosity cannot cope with these enormous figures; and that, in the absence of any philanthropist among the wealthy Hindus coming forward with a donation similar to that of Sir Ernest Cassell in Egypt, the bulk of the funds necessary should be found by Government.

The Hon. ophthalmic surgeons to the Association are Dr. B. P. Banaji, F.R.C.S.I., who has contributed occasionally to our columns, and Dr. B. H. Pesikaha.

The subject is one that might well be brought to the notice of the recently formed International Association for the Prevention of Blindness.

The International Association for the Prevention of Blindness

During the last few years the problem of the prevention of blindness has received widespread attention. Governments, municipal authorities and voluntary agencies have all initiated measures directed to this common goal. In this country Departmental Committees, after lengthy and searching enquiries, have issued reports and made recommendations to the authorities concerned, not wholly without success.

The Red Cross and other Societies in Europe, after a study by a provisional committee of the possibilities of international co-operation in the prevention of blindness, expressed the opinion that the time had arrived for definite movement of an international character towards this end. This Committee and the League of Red Cross Societies were joint conveners of a meeting held at Scheveningen, Holland, on the day following the termination of the International Ophthalmological Congress.

This meeting was attended by a large number of representatives of Red Cross Societies, Societies concerned with Public Hygiene, Infant Welfare, Prevention of Venereal Disease, Ophthalmology, etc. After a morning session at which the president of the meeting, General van Diehl, representative of the Red Cross Society of the Netherlands, addressed the meeting, and other representative speakers expressed their interest in the objects of the assembly, a resolution " declaring it highly desirable to establish a permanent international organisation for the prevention of blindness," and recommending the formation of an " International Association for the prevention of Blindness," was proposed and carried by acclamation.

At an afternoon session the proposed " statutes " of the newly

formed Association, comprising fifteen " articles " were brought forward and after being discussed and amended were adopted.

The officers of the Association are: President, Professor de Lapersonne, France; Vice President, Dr. Park Lewis, United States of America; Secretary-General, Dr. Humbert; Treasurer, Monsieur Demachy (Treasurer of the League of Red Cross Societies). An executive committee of 11 members, representing 11 nations was also elected. The British representative is Mr. A. B. Cridland, of Wolverhampton.

The unanimity and enthusiasm of the opening assembly augurs well for the future activity of the Association. It has a world-wide area in which to operate and its efforts to control the scourge of blindness will undoubtedly command the sympathetic interest and support of all nations.

For copies of this report of the meeting at Scheveningen, and of the constitution and byelaws of the Association, application should be made to the Secretary, 2 Avenue Velasquez, Paris.

ABSTRACTS

I.—DISEASE OF CONJUNCTIVA

(1) Lindner, K. (Vienna).—Is the bacterium granulosis (Noguchi) the causative organism of trachoma? (Ist das Bacterium granulosis (Noguchi) der Erreger des Trachoms?) *Arch. f. Ophthal.*, Bd. CXXII, S. 391, 1929.

(1) An interesting feature of Noguchi's work on trachoma was the fact that neither in the patients from whom the inoculation material was taken, nor in the monkeys inoculated, could inclusion bodies be demonstrated. This raised the question whether the American-Indian trachoma on which Noguchi had been working was not a different affection from trachoma as seen elsewhere. It was on this account that preparations were made for Noguchi to investigate the disease in Egypt and Europe, when his untimely death interrupted these researches. Noguchi's collaborators, however, invited **Professor Lindner,** of Vienna, to proceed to the United States to examine the inoculated monkeys and to study American-Indian trachoma.

Lindner reports that the monkeys submitted to him showed not trachoma but typical follicular conjunctivitis. In all cases the conjunctiva itself was soft and transparent, with no trace of papillary hypertrophy or thickening. The follicles present were mainly at the fornices, but were also seen on the tarsal conjunctiva,

and in most animals small, sharply limited follicles were present on the bulbar conjunctiva. In all secretion and injection were absent. Admitting that the monkeys in question (*macacus rhesus*) do not take trachoma well, Lindner stresses the fact that the clinical picture presented by these animals bore no resemblance to that obtained when the *macacus* is inoculated with the virus of trachoma bodies.

Having disposed of the problem of the inoculated monkeys as an error in diagnosis, Lindner expected to find that American-Indian trachoma was indeed different from European, and was in reality follicular conjunctivitis. He found, however, that this was not the case, the trachoma being in all respects, clinically and pathologically, of exactly the same nature as that seen in other countries. Inclusion bodies were found in 13 out of 19 cases examined, and the clinical pictures corresponded very well with the classification of trachoma as proposed by MacCallan and which has been used by the author throughout the investigation. As Lindner points out MacCallan's classification is useful not only in distinguishing between doubtful and established trachoma, but also in indicating the severity, duration, and anatomical state of the lesion. On the basis of the clinical and pathological findings in these nineteen cases Lindner concludes that American-Indian trachoma is definitely the same as trachoma elsewhere, and of the four cases from which Noguchi isolated his organism two were undoubtedly cases of trachoma (third stage trachoma, MacCallan) whilst the remaining two were perhaps trachoma, possibly follicular conjunctivitis.

Lindner holds that Noguchi failed to find inclusion bodies in his patients because of faulty technique, in not employing contrast staining. He further went wrong in considering the follicle as the characteristic feature of trachoma, thus confusing follicular conjunctivitis with trachoma. That it was indeed follicular conjunctivitis with which Noguchi was experimenting, Lindner advances the further evidence that the orang-utan which Noguchi found unsatisfactory for inoculation is a satisfactory animal for inoculation with inclusion-bodies virus, whilst the *macacus*, satisfactory for Noguchi's experiment is unsatisfactory for inclusion-bodies virus. Furthermore, Noguchi's organism gives a localised lesion and is unaccompanied by secretion, but inoculation with trachoma gives a diffuse conjunctivitis associated with secretion. Lindner holds that trachoma is a superficial epithelial lesion, in which secretion is absent on account of chronicity, whereas Noguchi's organism produces a dry, deep-seated lesion confined to the adenoid tissue.

The merit of Noguchi's work according to Lindner is the clear separation into two groups of lesions often confused, trachoma and

follicular conjunctivitis. It is of the latter lesion, and not of trachoma, that the bacterium granulosis is the causative organism.

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Lindner, K.—Ueber die Schwierigkeiten der Trachomforschung. *Zeitschr. f. Augenheilk.*, Bd. LVII, p. 523, 1925.

A. SOURASKY.

(2) **Fehmy, N. and Choukri, A. (Stamboul).—The Wassermann and the Meinicke reactions in trachoma. (La réaction Wassermann et Meinicke dans le Trachome.)** *Rev. Internat. du Trachome*, p. 36, January, 1929.

(2) **Fehmy and Choukri** have investigated two hundred trachomatous children attending a special school at Constantinople to determine whether there is any relationship between trachoma and syphilis, as is claimed by certain writers. Their findings are entirely negative, for only four out of the 200 gave a positive Wassermann reaction, and in these four, and in no others, the Meinicke reaction for syphilis was likewise positive.

A. SOURASKY.

(3) **Morax, V. (Paris).—Has trachoma increased in Paris since the War? (Le nombre des trachomateux a-t-il augmenté à Paris depuis la guerre.)**

Nida, M. (Paris).—A statistical note concerning trachoma among out-patients at Quinze-Vingts between 1914-1928. (Note statistique sur le Trachome à la clinique des Quinze-Vingts de 1914 à 1928.) *Rev. Internat. du Trachome*, pp, 22 and 25, January, 1929.

(3) **Morax** gives statistical tables of the incidence of trachoma among the new patients at the Lariboisière during 1903—1927. The incidence has always been below one per cent., and of recent years has shown a slight rise. Analysing the data for several years as to the country of origin of the patients, Morax shows that the largest single factor responsible for the increase in trachoma is Algeria, whence France is now drawing labour. Other countries (including England) have supplied isolated cases.

At the Quinze-Vingts conditions are very similar. **Nida** shows in his study extending over the period 1914-1928 that trachoma is responsible for only about 0·33 per cent. of new patients, and of the trachomatous patients about fifty per cent. are Algerians or have been infected in Algeria.

A. SOURASKY.

(4) **Zachert (Warsaw).—Trachoma statistics in Poland. (Statistique du Trachome en Pologne.)** *Rev. Internat. du Trachome*, p. 13, January, 1929.

(4) Hirschberg used to say that a country is trachomatous when out of 1,000 eye cases, 150 are of trachoma. By that standard Poland is only about half trachomatous, for in four different university clinics, the percentage of trachoma cases varied between 5·6 and 10·8 during 1924. **Zachert** also gives the results of the routine examinations conducted among school-children and among recruits for the Polish army. Amongst nearly three quarters of a million secondary school children the percentage of affected was 0·76, a rate which is distinctly lower than that obtained for over 100,000 children in elementary schools in whom trachoma affected 3·01 per cent. Among over 800,000 candidates for the army seen during 1924-1926, 1·14 per cent. were found to be trachomatous. By a quite unjustifiable calculation Zachert concludes that in Poland the rate of trachoma is 14 per 1,000. It is surely inadmissible to take 700,000 secondary school children (*i.e.*, a selected population) and only 100,000 elementary school children (*i.e.*, a more typical example of the population) and add to these data obtained from recruits of districts that give such varying percentages of affected candidates as 27·3 and 0·7, and on this highly incongruous mixture calculate an average per 1,000.

A. SOURASKY.

(5) **Wilson, R. W. (Cairo). — Further observations on the aetiology of trachoma. (Nouvelles notes sur le problème étio-pathologique du Trachome.)** *Rev. Internat. du Trachome*, p. 76, April, 1929.

(5) In a preliminary note read before the Ophthalmological Society of Egypt (recorded on p. 36 of the Bulletin for 1928) **Wilson** reported the isolation of an organism similar to the bacterium granulosis of Noguchi in some cases of trachoma. He has since carried out further investigations to determine whether this organism can cause trachoma in inoculated monkeys.

The problem is, however, one of considerable complexity, for animals, especially cats, dogs and monkeys are susceptible to a follicular conjunctivitis of their own, often simulating the trachoma of man. This follicular conjunctivitis may come spontaneously (Wilson saw it in 12 out of 16 monkeys in the Zoological Gardens of Cairo) or may develop after trauma, and therefore when a trachomatous-like conjunctivitis is produced experimentally in an animal, it does not follow that the particular organism introduced was responsible for it. The question is still further complicated by the fact that Wilson can find inclusion bodies in trachoma only

exceptionally, and that he is thus unable to determine whether a particular conjunctivitis is trachoma or not on the basis of histological findings. He is therefore compelled to rely upon the clinical picture in deciding the nature of the lesion, and this procedure has a complication of its own in the fact that if trachoma can be inoculated in monkeys it seems to take a modified form; Wilson was unable to establish true trachoma in two monkeys inoculated with trachoma virus.

Of monkeys inoculated with the organism suspected to be the cause of trachoma, one showed no change and three developed conjunctivitis which had a strong resemblance to trachoma, but in Wilson's opinion was not trachoma. It was conjunctivitis only, with no tendency to corneal complications. As Wilson had to judge by the clinical picture it must be said that in his view the characteristic features of trachoma are not follicles but scarring and corneal involvement, and it is owing to the absence of these or other evidence of stage III (MacCallan's classification) that he concludes that the organism is not the one responsible for trachoma.

A. SOURASKY.

(6) **Canis (Constantine, Algeria). — Geographical distribution and infectiousness of trachoma. (Répartition géographique du Trachome et contagiosité.)** *Rev. Internat. du Trachome*, p. 106, July, 1929.

(6) **Canis**, who examined all the natives aged 20 years, living in a large area in Algeria, has drawn up tables showing the incidence of trachoma in the different communities, and from these he concludes that trachoma follows the lines of communication of this country, being high wherever the two main railway lines pass through the land. That it is indeed the lines of communication which determine the spread of trachoma, and not merely valleys or waterways along which these railway lines often stretch, he shows by the fact that separate communities along the same stream may show the extreme variation of one having no trachoma at all and others being highly infected. Altitude does not appear to play any part in the distribution of trachoma in Algeria, for in the district investigated by Canis the two main centres are about equally affected, yet one lies on the sea and the other has an altitude of 650 metres; furthermore some outlying villages on this high plateau are entirely free from trachoma, and this, in the author's opinion, is due to the fact that they are very difficult of access, the journey necessitating two days travel and the employment of mules.

Canis therefore rules out climatic conditions as the source of spread of trachoma, and holds direct contamination responsible.

But the problem of the infectiousness of trachoma is not so simple. He recalls the evidence that though in some French regiments consisting of both European and colonial elements as many as 30 per cent. of native soldiers have trachoma, yet French soldiers are not infected in spite of close and prolonged contact. And there is the further fact that in spite of the great number of infected non-European soldiers in France during the war, trachoma never gained a footing in that country. The author brings forward a formidable list of authorities who doubt the infectiousness of trachoma, quoting amongst others Morax and Truc. Morax is of the opinion that the contamination of an adult is exceptional, only children being susceptible. In this connection the results of an investigation in Amsterdam are of interest. In that city it was found that school-life makes but little difference in the incidence of trachoma, as the trachomatous children are already infected by the time they enter school, and that the disease is spread among children before the school-age, the means of spread being not so much the family as the children playing together in dirty streets. Another fact of interest is the observation by Bidault that amongst tribes living on the border of the Sahara, as many as 90 per cent. of the children show trachoma by the age of 3.

Canis concludes that trachoma is spread by direct contact, children being highly susceptible, susceptibility diminishing rapidly so that the adult is but exceptionally infected.

A. SOURASKY.

II.—MISCELLANEOUS

(1) **Bücklers, Max** (Zürich).—**Experimental and histological research on the effect of highly concentrated ultra-violet rays on the eye of the rabbit.** (**Experimentelle und histologische Untersuchungen ueber den Einfluss von hochkonzentriertem Ultraviolett auf das Kaninchenauge.**) *Arch. f. Ophthal.*, Vol. CXXI, p. 73, 1928.

(1) This paper by **Bucklers** records work that is a continuation of the researches done in Vogt's Clinic on the action of light upon the eye. His findings go to show that isolated ultra-violet of 400-285 $\mu\mu$ even in concentrated form causes only temporary and superficial changes in the eye. It is only by the highest concentration of the total energy of the mercury vapour lamp that it is possible to produce burns in the anterior portion of the eyeball; this result is due not only to the ultra-violet with its enormously

increased intensity but also to the action of the visible spectrum and the infra-red rays.

In the production of these burns, which lead to necrosis of the cornea and severe changes in the iris, the lens is obviously also affected in the pupillary area but not in the parts protected by the iris. It was not possible to determine the action of the different parts of the spectrum in causing these changes. The experiments bring out very clearly the totally different action of the ultra-violet and the infra-red rays; while the latter after an exposure of half-an-hour cause extensive opacities in the lens, the main effect of the ultra-violet rays is to set up changes in the cornea and temporary opacity of the aqueous.

Histological examination confirms the fact that it is impossible to produce changes in the lens with ultra-violet rays even in high concentration, while they are readily induced with infra-red rays. Bücklers is of opinion that for examination of the anterior portion of the eye, and particularly of the anterior chamber, slit lamp microscopy is superior to the histological method.

THOS. SNOWBALL.

(2) **Zborowsky, W. F.—On the treatment of spastic entropion by the method of L. Weekers (alcohol injection.) (Ein Beitrag zur Behandlung des Entropium spasticum nach Verfahren von L. Weekers.)** *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXX, S. 648, 1928.

(2) The technique employed by Weekers (*Arch. d'Ophtal.*, XLV., S.20 1928), (*Brit. Jl. of Ophthal.*, Feb. 1929, p. 84), in the treatment of spastic entropion has been modified and adapted by **Zborowsky** Weekers employed 0.5 to 0.75 c.c. of 80 per cent. alcohol which was injected under the skin of the eyelid 3 mm. from the lid margin, 5 to 10 minutes after a preliminary injection of novocaine. The present author, however, found in a test case that this technique was followed by massive necrosis, cicatricial ectropion and epiphora. He therefore injected 0.8 c.c. of 80 per cent. alcohol more deeply, along the whole length of lid superficial to the tarsus. The entropion was cured : but some deep necrosis occurred in the neighbourhood of the punctum which was followed by a partial ectropion and epiphora. A further modification was therefore tried wherein 0.4 c.c. was injected, along the outer 2/3 of the lid only, so as to avoid the region of the punctum. The subsequent necrosis and contraction in two cases gave good and satisfactory end-results after a reaction-period lasting some days.

W. S. DUKE-ELDER.

(3) **Elschnig, H. H.—A hyphaema in a vitreous hernia into the anterior chamber.** (**Hyphäma in Glaskörperhernien der Vorderkammer.**) *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXX, S. 200, 1928.

(3) **Elschnig** has met the condition of a small hyphaema forming in the vitreous prolapse into the anterior chamber which sometimes occurs after the intra-capsular extraction of cataract. Knapp, speaking of the late results of this type of extraction at the Ophthalmological Society of the United Kingdom in 1925, mentioned this as a rare complication, and noted that the blood staining remained unchanged for several months. In the present case a considerable amount of fluid blood remained in the protrusion of the vitreous through the pupil, and absorbed very slowly. There were no ill-effects.

W. S. DUKE-ELDER.

(4) **Rönne, H. (Copenhagen).—The diagnosis of inflammatory exophthalmos in acute infections.** (**Die Diagnostik des inflammatorischen Exophthalmos bei akuten Infektionskrankheiten.**) *Zeitschr. f. Augenheilk.*, Vol. LXVIII, p. 1, 1929.

(4) In an instructive article on the differential diagnosis and the treatment of acute exophthalmos **Rönne** lays special stress on what he calls the collateral inflammatory oedema of the orbit caused by an extra-orbital focus of inflammation. The exophthalmos caused by this condition is but a part of the clinical picture: the severe oedema of the orbit also manifests itself by very swollen lids, chemosis and limitation in all directions of movement of the globe. Indeed the exophthalmos may be be overlooked owing to the severity of the other lesions.

Exophthalmos of this type, *i.e.*, the result of an orbital oedema, may occasionally be present in cases of panophthalmitis, but far the commonest, " if not the only," cause of pure orbital oedema is infection of the nasal sinuses. The nasal origin of acute exophthalmos has been very much overlooked, according to Rönne. He himself has seen it frequently, especially as a complication during infectious fevers in children, more particularly in scarlet fever. In these cases the orbital oedema with its associated exophthalmos is the direct result of acute ethmoidal sinusitis. It is important to recognise these cases as their course is favourable and under conservative treatment they subside. The prognosis is good in spite of the alarming appearances of some of these cases. Operative treatment in the way of making incisions into the orbit is particularly to be condemned, as these expose the patient to the very serious risks of secondary infections, which are specially prone to supervene in scarlet fever. Rönne remarks that this type

of exophthalmos appears to be better known to epidemiologists than to oculists.

A more serious problem is presented by those cases where this orbital oedema masks a septic focus in the orbit. An uncomplicated localised abscess in the orbit would give focal symptoms, such as limitation of movement, being more marked in one direction than in another: but with superadded inflammatory oedema there is danger of overlooking a collection of pus in the orbit—a danger which carries with it risks not only to the eye but to life. Unfortunately there appears to be no way of conclusively solving this difficulty, and Rönne's practice appears to be based on the principle of not interfering if the sinus infection is fresh, but operating if the sinus infection is an acute recrudescence of an old infection, the reason for this attitude being that orbital oedema associated with an old sinus infection probably points to a sinus empyema having broken through into the orbit, whereas orbital oedema in a fresh sinusitis is probably part of the oedema associated with the inflamed sinus. Spontaneous healing may therefore be expected in the latter case, but an empyema breaking through into the orbit requires radical treatment promptly carried out.

Old sinus infections breaking through into the orbit are more likely to take the form of sub-periosteal abscesses than definitely intra-orbital abscesses. The associated inflammatory oedema may or may not be sufficiently severe to mask the local nature of this type of abscess—and exophthalmos need not be a feature in this clinical picture.

It would therefore appear that orbital cellulitis is not common either as a complication of sinus infection or as a cause of exophthalmos. Rönne holds that erysipelas of the face is, however, prone to give rise to orbital cellulitis by direct extension. In his experience abscess formation of the lower lid is an intermediate step, and these abscesses should be surgically treated to avoid further extension. Extension through the cavernous sinus is, however, possible.

Finally Rönne also advances " rheumatic tenonitis " as a cause of acute exophthalmos. Apparently it is to be diagnosed by its mild course, by its tendency towards bilateral involvement, and uveal lesions.

Rönne's article emphasises the conservative treatment of acute exophthalmos, and it must be noted that when operative interference is decided upon the subperiosteal route rather than incision into the orbit is to be preferred, as an abscess of a sinus breaking through is more likely to track subperiosteally than into the cellular tissues of the orbit.

A. SOURASKY.

(5) **Diaz-Caneja (Valencia).—On binocular alternating vision. (Sur l'alternance binoculaire.)** *Ann. d'Ocul.*, CLXV, p. 721, 1928.

(5) **Diaz-Caneja** refers to a paper by Magitot discussing Boes's experiments on the electric current in the retina of certain fishes. Stimulation of the separated retina by a bright light is stated to be followed in the dark by recurrent electrical oscillations. Caneja designed a coloured figure for study in a stereoscope, composed of concentric circles in the two temporal fields. Lines intersect in the centre of each so as to facilitate fixation of these central points by the two eyes. Steady fixation of the centre by an effort of the attention leads to a peculiar phenomenon. The more perfect the attention, the more regularly does the phenomenon occur. At one moment a confused picture of mixed lines and circles is seen, but with good attention complete circles or complete parallel lines are perceived alternately at intervals of a few seconds. After a few minutes close observation of the figures in a good light, closure and covering of the eyes produce after images of the same kind, but with much more regular alternation. A consideration of possible explanations follows.

(Similar alternation of the images of the temporal fields with those of the nasal fields is produced when monochrome figures of the same pattern are used. For this purpose a photographic reproduction was obtained. The coloured figures, however, make the effect more dramatic.—H.N.)

HUMPHREY NEAME.

(6) **Duverger, C. (Limoges).—Senile ectropion and entropion. (Ectropion et Entropion Séniles.)** *Arch. d'Ophtal.*, June, 1929.

(6) The treatment of the senile form of ectropion and entropion is such a well-worn subject that little that is novel can be expected from any writer, and this paper contains little more than a description of the methods which the author has found most satisfactory and lasting. In dealing with ectropion two essentials are: (1) a sufficient shortening of the free border of the lid, which at the end of the operation should appear excessive; and (2) a solid re-formation of the external angle, *i.e.*, an exact adhesion of the free edge of the lower lid to that of the upper. Local anaesthesia by a 4 per cent. solution of novocaine is employed. **Duverger** treats ectropion by removal of a fairly large triangle of the whole thickness of the lower lid at the outer canthus, the upper margin of which is continuous with the line of the upper lid. The two incisions are made with straight scissors, and after making the more external cut, the freed lid is seized by forceps and drawn outwards gently to measure the width of the segment for removal;

usually 1 to 1.5 cm. The important suture is that which unites the two cut surfaces to form the new canthus; this should be inserted with mathematical accuracy, and followed by two or three others in the length of the incision. In severe and long-standing cases an additional measure is cauterisation of the thickened fleshy conjunctiva of the everted lid.

In entropion Duverger adopts a similar method of removal of a triangular piece of the lower lid at the outer canthus combined with excision of the fibres of the orbicularis muscle in the lower lid close up to the ciliary margin. This is done after the triangle has been removed but before it is sutured, and while the freed lid is held by forceps and drawn outwards by an assistant.

The steps of these operations are easily followed in the six illustrations which accompany the letterpress. During the last four years the author has treated 12 cases of entropion and 20 to 25 of ectropion, on these lines.

J. B. LAWFORD.

(7) **Sommer, Ignatz (Vienna, Austria) and Yaskin, Joseph C. (Philadelphia).—Spontaneous nystagmus.** *Arch. of Ophthal.*, July, 1929.

(7) **Sommer** and **Yaskin's** paper presents some clinical points in the determination of the nature of " spontaneous " nystagmus. For practical purposes, this symptom is divisible into three groups, neurological, otological and ocular. The method of diagnosis is to observe the nystagmus for the following characteristics: (1) Type; is it horizontal, rotatory, vertical or a combination of these? A pure nystagmus horizontal, rotatory or vertical usually indicates a lesion in the brain stem (arcuate vestibular fibres or posterior longitudinal bundle) whereas a horizontal rotatory nystagmus is usually of peripheral labyrinthine origin. (2) The direction of the quick component; if not directed, *i.e.*, undulating, it is usually of ocular origin. If directed, it is divisible into the following groups: in the first a spontaneous nystagmus develops when the eye is turned in the direction of the quick component, in the second it is present when the eye is looking straight ahead and in the third, the quick component is in the opposite direction to that in which the patient looks. The first and second degrees may be of any origin while the third is due to a lesion of the brain stem or ocular apparatus. (3), Frequency; slow, medium, or high. The extremes are usually of ocular origin, while medium frequency occurs in peripheral labyrinthine and central nystagmus. The same is true with regard to (4) amplitude, which may be small, medium or large. (5) Associated or disassociated nystagmus, *i.e.*, whether the eyes move simultaneously in the same direction at the same speed. The disassociated variety is always of ocular origin. (6) Perman-

ency. The duration may be from a few seconds to a lifetime; if brief it indicates a labyrinthine cause, if throughout life an ocular cause, whereas changeability indicates central nystagmus. If conclusive evidence is not obtained from an examination such as this, the authors recommend using the more complicated tests, such as the galvanic, caloric, and rotatory ones. The authors then turn to the consideration of diplopia associated with nystagmus, a symptom which was present in almost half their cases without coexisting involvement of the extraocular muscles. Its importance lies in the facts (1) that it may be the only symptom complained of by the patient, who is often totally unaware of his nystagmus and (2) that it usually indicates a lesion of the central nervous system. Diplopia does not occur in ocular nystagmus because this condition commences in early childhood before fixation as such has been acquired and often in association with amblyopia. It also does not occur in acute cases, which are usually of labyrinthine origin, because of the associated dizziness and spatial disorientations which prevent the recognition of diplopia. The paper concludes with an account of ten cases of various types of nystagmus.

F. A. W.-N.

(8) **Freeman, Ellis (Ithaca, New York).—What does a test of visual acuity measure.** *Arch. of Ophthal.*, July, 1929.

(8) **Freeman's** paper demonstrates " the enormous complication of a function on which a fictitious, though perhaps practically useful simplicity, has been conferred." The function is, of course, visual acuity and the fictitious simplicity is the assumption that goemetric relationships alone determine and explain visual acuity; in other words that 60/60 represents the same vision as 6/6. The question was tackled by Aubert, for peripheral vision, as long ago as 1865. He found that small and near complexes could be resolved by a more peripheral part of the retina than could large complexes placed sufficiently far away to subtend the same visual angle, the difference in favour of the near and small objects being as much as 50 per cent. On the other hand the author has recently obtained directly contradictory results by using the following method. The contrast consisted of two black squares with a mechanical device whereby the white interval between them could be gradually increased from zero up to the point at which the two squares could be distinguished as separate surfaces. The acuity was thus inversely proportioned to the width needed for resolution. The complex was placed at a chosen distance from the fixation point and with this method, visual acuity for the large object was in some cases as much as 80 per cent. better than for the small one. Jacobson, working on the fovea and employing letters of various sizes, found that the size of the letter was not proportional to the distance at

which it could be resolved; in this case large distant letters required a greater visual angle for resolution than did small near ones. The same was found to be true with grey and white stripes in place of letters; and in the recognition of the colours of various sized surfaces. The author does not attempt any solution of these difficulties and concludes with the sentence "To recognize them as problems is to become liberated from the trammels of the one attitude which has prevailed in optics, namely, that of geometry, and perhaps to prepare the way to a juster description of the facts which have been observed by that attitude."

F. A. W.-N.

(9) **Ferree, C. E. and Rand, Gertrude (Baltimore).—Lighting and the hygiene of the eye.** *Arch. of Ophthal.*, July, 1929.

(9) **Ferree and Rand** have been at work for some years on problems connected with lighting and this paper gives an account of some of their findings. The main factors the effects of which have to be tested are:—wave length and composition of light, purity and intensity, hue, saturation and brightness, also evenness of illumination and of surface brightness, difference of light and the angle at which light falls on the work. It is no use testing these merely by their effect on visual acuity since other properties of the eye are of equal if not greater importance, especially from the economic standpoint. Such properties are, speed of discrimination, power to sustain clear vision for a period of time, the occurrence of ocular fatigue and discomfort, the power of separating the functions of accommodation and convergence. With regard to wave length, the best results are obtained from the mid region of the spectrum, and the purer the colour the less the blurring from chromatic aberration. There are other factors to be taken into consideration, however, and one of the most important is that colour forms an unfavourable background against which to discriminate details in black. It is, therefore, found practically that white light is the best for reading. Owing to irradiation phenomena it is found that black print on white paper is easier to read than white print on black paper. With large objects, however, and high intensities of illumination, the speed of discrimination is higher for the white object on black. As saturation is increased for any hue, its inferiority to white as a background for black is increased. Increase in intensity acts as follows: The benefit is greater (1) when the details to be discriminated are small and when the difference in co-efficients of reflection from the background is small. Under all conditions investigated, however, the benefit of increase of intensity was still present to a considerable degree at 100 foot candles. (2) For light objects on dark backgrounds than for the reverse. (3) For ametropic than emmetropic eyes and (4) for

the old than for the young eye. Evenness of illumination is obviously desirable since in its absence the eye has to be continually adjusting itself and this leads to fatigue. The same is true of specular reflection, for this reason paper should not be glazed unless the illumination is received from totally indirect reflectors or from direct reflectors, provided with a means of diffusing the light. High brilliancies, *e.g.*, naked lights, in the field of vision should also be avoided because of their effect on the size of the pupil. In some of the lighting systems tested by the authors, the highest brightness in the field of view was 800,000 times that of the working surface. The presence of this in the visual field (1) diminishes the size of the pupil and renders the work less visible because less light comes into the eye from it, (2) produces a blinding effect through irradiation and (3) produces disturbances and fatigue in the mechanism for adjustment of the eye. With regard to the discomfort such a light produces, it is found that in the horizontal meridian the maximum sensitivity is around the 45° point and in the vertical meridian around 15° below the horizontal. Footlights are therefore " the worst lights that have been devised by the misdirected ingenuity of man to confound and torture the eye." Some of the authors' points have been brought out in an ophthalmic survey on post office employees. It was found (1) that in mail sorting an increase from 3.6 to 8 foot candles of light on the working plane caused an average increase of 4.4 per cent. in speed of work, and a net saving of 109,000 dollars a year to the post office. (2) The diminution of fatigue was more marked in those who suffered from defects of the eye. (3) Ocular defects were less frequent among the group of employees who worked under the higher degree of illumination. (4) Coloured envelopes were sorted with less ease than white ones, and the same was respectively true with regard to glazed and matt surfaces.

F. A. W.-N.

(10) **Barczinski, (Allenstein).—A case of ophthalmomyiasis interna anterior (Behr).** (**Ein Fall von Ophthalmomyiasis interna anterior.**) *Zeitschr. f. Augenheilk.*, Bd. LXVIII, p. 353, 1929.

(10) Under the name of ophthalmomyiasis, Behr described a condition in which larvae of flies were found in the interior of the globe. At the time of the original article, in the year 1920, four cases were known and to this number Behr added one more. The division into anterior and posterior varieties of ophthalmomyiasis is based upon the distinction as to whether the larvae are to be found in the anterior chamber or not. The case recorded by **Barczinski** is the seventh, a sixth having been reported in the interval.

The present case concerns a boy aged six years, whose left eye had been inflamed and blind for ten days. In the highly inflamed eye a foreign body about 1 cm. long and 2 mm. wide could be seen, and as this appeared to be the source of irritation, the anterior chamber was opened under general anaesthesia and the object removed. The eye then made a rapid and uneventful recovery. Examination of the foreign body removed showed it to be the larva of a gadfly (*hypoderma bovis*).

The case reported agrees in the main with those described by Behr, and the youth of the patient is in support of Behr's view that the thinness of the tunics of the young eye allows the larvae to bore their way into the eye. The favourable result obtained in the present case is also in agreement with the previously recorded cases, for the cases of the anterior variety of the condition did well, but the two recorded cases of ophthalmomyiasis interna posterior led to severe reactions, ultimately necessitating enucleation. One feature of interest in the present case is the fact that on recovery the lens of the affected eye was seen to be subluxated. The author believes that this is to be explained by the larva having bored its way through the suspensory ligament and thus having damaged it. A localised opacity in the lens is likewise ascribed to the action of the larva.

A. SOURASKY.

CORRESPONDENCE

CIRCULATION

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIR,—The interesting experiment of perfusing an isolated head with watered blood, so skilfully carried out by Mr. and Mrs. Duke-Elder and published in August, 1929, in this journal, affords a striking instance of the inadequacy of the canal of Schlemm to maintain normal equilibrium and to prevent hypertension, under the conditions of the experiment. It also seems to lend support to the view that the aqueous humour passes from the eye mainly by the venae vorticosae and that the rôle of the canal of Schlemm is subsidiary. If one assumes, and the steadiness of capillary function during the experiment seems to justify this, that the water in the blood has not caused oedema of the cells, the increase of intra-ocular pressure will tend to promote the flow of fluid through the canal of Schlemm, while the decrease of both colloid and

crystalloid in the blood will greatly lessen the molecular attraction of the venous blood for water. If there be increase of molar flow through the canal and decrease of molecular flow through the veins, clearly then, so far as increased intra-ocular pressure depends upon interference with the outflow from the eye, this will be due to decrease of the outflow through the veins. As the amount of chloride of sodium in tissue fluid is the same as that in the aqueous humour, absorption from the eye will take place under the same conditions as in the general circulation, except that as the eye has no lymphatics, the amount of fluid to be absorbed will be relatively larger, while as the aqueous humour contains less colloid than tissue fluid the rate of absorption will be greater. If the venous pressure in the eye be slightly greater than the intra-ocular pressure, there will be movement of fluid through the canal of Schlemm during systole only, any slight reflux being checked by the oncoming systole, while molecular movement toward the veins will be largely independent of the normal variations of intra-ocular pressure.

The pectinate ligament, at its narrow apex, is scarcely in contact with the canal of Schlemm, while throughout its length and at its relatively broad base it is in contact with tissue which drains through the venae vorticosae and its structure and relations favour movement of fluid towards these veins by onkotic pull.

As the origin of hypertension in the experiment is largely in the vitreous chamber, even if the saturated vitreous colloids exert no onkotic pull, the first barrier to the movement of fluid will be the suspensory ligament. It has not been determined whether insufficiency of this ligament or direct pressure of the ciliary body causes the shallow anterior chamber found in glaucoma, but the blood-carrying system is a relatively isolated one running through the eye and the experiment shows that the increased pressure is due to obstruction to the aqueous flow as there is no evidence of venous congestion.

Our views of circulation generally seem to be in some danger of becoming confused. The Almighty, apparently can and does maintain unstable equilibrium, involving three and even more variables, almost as a matter of routine. Generally speaking, mathematicians are unable to furnish formulae demonstrating the actions of three variables nor the resultants derivable from them, so that the outlook for a comprehensive quantitative statement of circulation does not seen hopeful. The Great Architect, however, so far as we can judge, does not employ cumbrous methods and it seems safer to conclude that it is our standards that are unsuitable. Ordinary weights serve commercial purposes well enough, but are ill-adapted to measure the to and fro transferences of minute

quantities of ions and molecules, characteristic of the reversible chemical reactions, underlying the unstable equilibrium upon which circulation and physical life depend. Fortunately there are indications that it may be possible to measure these reactions, so feeble to our ordinary standards, in electro-magnetic units and to state the problem in much simpler terms.

Yours truly,

RICHARD KERRY.

MONTREAL.

NOTES

Death

WE regret to announce the death of Professor H. Snellen, of Utrecht.

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Appointment

MR. W. BAINBRIDGE, M.B.(Edin.), D.P.H., has been appointed hon. ophthalmic surgeon to the Hull Royal Infirmary.

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Corrigendum

IN the special report of the International Ophthalmological Congress at Amsterdam, 1929, an error occurs on page 15, where the paper on "A survey of the methods employed in Scotland for the control of ocular disease of venereal origin," is attributed to Mr. A. G. A. Mackay. The author of this paper is Dr. George Mackay. The mistake, which we greatly regret, was due to the Secretariat in Holland.

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Royal London Ophthalmic Hospital Dinner

THE annual dinner of the past and present students of the Royal London Ophthalmic Hospital will be held at the Langham Hotel, on Thursday, February 13, at 7 for 7.30 p.m. The Chairman is Mr. J. Herbert Fisher, consulting surgeon to the hospital. Tickets (excluding wine) 15/-. Applications for tickets should be addressed

to Mr. Rupert Scott, 70, Harley Street, W.1, and much inconvenience will be avoided if remittance accompanies application. The secretaries are Mr. Charles Goulden and Mr. Rupert Scott.

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Ophthalmological Society of the United Kingdom

THIS Society will celebrate its Jubilee at the Annual Congress, which has been arranged for April 3, 4, and 5, 1930. The subject for discussion, which will be held on Thursday, April 3, at 2.30 p.m., is "Disorders of secretion of the endocrine glands associated with eye diseases." The following are the openers of the discussion:—Mr. J. Herbert Fisher, Professor H. Maclean, Dr. W. Clarke Souter, and Professor E. C. Dodds.

Members wishing to take part in the discussion or to communicate papers should communicate with Mr. Maurice Whiting, 51, Wimpole Street, W.1.

FUTURE ARRANGEMENTS

1930

January 10.—Section of Ophthalmology, Royal Society of Medicine.

January 17.—North of England Ophthalmological Society, address by Professor Van der Hoeve at Sheffield. Subject: "X-ray Diagnosis in Ophthalmology."

January 20.—North of England Ophthalmological Society, address by Professor Van der Hoeve at Leeds. Subject: "Strabismus."

January 21.—North of England Ophthalmological Society, address by Professor Van der Hoeve at Manchester. Subject: "Tumours and Pseudo-Tumours of the Eye and Orbit."

February 4.—Midland Ophthalmological Society, at Birmingham.

February 7.—North of England Ophthalmological Society, at Newcastle-on-Tyne.

February 13.—Annual Dinner of the Royal London Ophthalmic Hospital.

February 14.—Section of Ophthalmology, Royal Society of Medicine.

March 7.—North of England Ophthalmological Society, at Liverpool.

March 14.—Section of Ophthalmology, Royal Society of Medicine. (Clinical Meeting.)

March 28.—North of England Ophthalmological Society, at Sheffield.

April 1.—Midland Ophthalmological Society, at Wolverhampton.

April 2-5.—Ophthalmological Society of the United Kingdom, Annual Congress.

June 3.—Midland Ophthalmological Society, at Worcester.

June 13.—Section of Ophthalmology, Royal Society of Medicine. (Annual Meeting.)

July 10-12.—Oxford Ophthalmological Congress, at Oxford.

October 7.—Midland Ophthalmological Society, at Birmingham.

December 2.—Midland Ophthalmological Society, at Birmingham.

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *November, 1929.*

HOLLOWAY and DE LONG. Peripheral pigmentation of the cornea associated with lenticular degeneration of the pseudosclerosis type.
FUCHS, A. Pathological dimples ("Dellen") of the cornea.
POST. Dendritic keratitis.
MACKAY. Ophthalmoplegic migraine.
HOLLÓS. Modification of tear sac operations.
JACKSON. Principles applied in use of cross cylinders.
SHAPIRO. Hemangioma of the orbit.

Archives d'Ophtalmologie. *October, 1929.*

CHRISTIANSEN. Concerning supra-sellar tumours.
TERRIEN and RENARD. Remarks on so-called "azometic" retinitis.

November, 1929.

TERRIEN and FAVORY. Circumscribed abscess of the sclerotic.
BOURGUET. Reflections on our method and that of Simons Hirschmann of pituitary puncture.
CHARAMIS. Abnormal form of Marcus Gunn's phenomenon.
PERRIN. Subconjunctival injections of neutral atropine sulphate in ocular therapeutics.
DUVERGER. Technique for the avoidance of haemorrhage during operation on the lacrimal sac.

Acta Ophthalmologica. *Vol. VII, No. 3.*

BERG. Observations on the theory of ophthalmometric measurements of curvature of surfaces.
MÖLLER. Familial angiomatosis retinae et cerebelli—Lindau's disease.
GERTZ. Extended mechanical analogy of the colour triangle.

VESTERGAARD Insulin and ocular tension.
HEINONEN. On the problem of the frequency variations in myopia.
EHLERS. Retinitis pigmentosa and abnormal course of the long ciliary arteries.
GRÖNBLAD. Angioid streaks—Pseudoxanthoma elasticum.
GRANSTRÖM. A case of keratitis pustuliformis profunda.

Klinische Monatsblätter für Augenheilkunde.

October-November, 1929.

VOGT. Copper and silver deposited in the eye, liver, spleen and kidneys as a symptom of pseudosclerosis.
HERRENSCHWAND. On the morphological findings in the eye in periarteritis nodosa in comparison with those in sepsis lenta.
GOLDMANN. Experimental supra-nuclear cataract and nuclear sclerosis,
PELLATHY. A. VON. Pathological anatomy of experimental tetany cataract in dogs.
MONJUKOWA, FRADKIN, and HEYFETZ The reticulo-endothelial system and the eye.
FAZAKAS. On the topography of the lacrimal punctum with special consideration of the mechanism of the first part of the lacrimal drainage system.
MIKAELJAN and TARNOPOLSKY. Material concerning the meaning of the constitution in trachoma.
VANNAS. Eccentric mydriasis as an indication for optical iridectomy.
DEGGELER. Septic uveitis after an injury with a foreign body accompanied by universal pyaemic symptoms.
KLEIN. Discussion on the rarer forms of choroidal sarcoma.
SABATZKY. A new method of rapid healing of ulcus serpens with conservation of the transparency of the cornea.
MALKIN. Results with iontophoresis in corneal ulcers.
POLJAK. Observations on the treatment of lacrimal obstruction.
SEGELKEN. Observations on dye therapy with solutions of aniline derivatives in ophthalmology (sol. methyleni coerul. composit.)
FRIEDMANN. New Hebrew and International tables for sight testing.
HUBER. Alterations of refraction following trauma.
GERNET. Methods of combating trichiasis of the lower lid.
LÉNÁRD. Machine for the preparation of the skin flap in plastic operations.
KANBAI. A needle for epilation and transplantation of lashes.
SCHOENBERG. Prismoscopic perimetry. (A new method for the delineation of paracentral scotoma and other defects of the field of vision.)
WEGNER. A demonstration polyophthalmoscope.
LÖWENSTEIN. On the paper of Dr. Fazakas "New points of view in the treatment of tabetic optic atrophy by means of endo-lumbar and sub-occipital pneumocephaly."
PFLUGK. On the question of loosening of the zonular lamella in glass blowers' cataract.
KOYANAGI. A case of cavernous angiomatosis of the optic nerve.
ISHIKAWA. On the question of the connection between peripheral corneal ectasia and disturbance of the internal secretions.
HOLTH. The mounting of the object dial at the focal point in subjective kinematoscopy.

Archiv für Ophthalmologie. *October, 1929.*

KYRIELEIS. Researches on poisoning by strychnine on so-called pupilotonia (as well as observations on the question of strychnine poisoning with normal and pathological movements of the pupil).
SAFAR. On the origin of an orange yellow colouration in the interior part of the eye in connection with hyphaema (xanthomatosis bulbi of von Szily).
LEVINSOHN. Short observations on the pathogenesis of papilloedema.

FUCHS, E. On the exudate in chronic iritis.
OHM. On the study of nystagmus.
JAHNKE, Leucocytic reactions in the eye.
MATSUI. On culture of the substantia propria of the cornea of the rabbit in vitro.
AUST. Observations on the study of trachoma (inclusion conjunctivitis, inclusion blennorrhoea, swimming bath conjunctivitis and their connection with each other.)
TABORISKI. Experimental and clinical researches into trachoma and similar diseases of the conjunctiva.
THIES. Early plastic operations in corrosive burns of the eye.
FUCHS, E. Emendation of my communication "On foamy inclusions in the choroid."

Annali di Ottalmologia e Clinica Oculistica.

August-September, 1929

MAGGIORE. Experimental contribution to the mechanism of cicatrisation in anterior perforating sclerectomy.
PANICO. Cataract from chloride of soda.
TESSIER. Final contribution to the cure of spring catarrh with injections of adrenalin.
SCOTTI. Clinical observations on the behaviour of the corneal opacities in sclerosing keratitis.
ANTONIBON. Graphic representation of the movements of the eye in reading.
MORETTI. A new operation for trachomatous pannus.
RICCI. On the various applications of my luminous percentage optometer.

Bolletino d'Oculistica. *October, 1929.*

BIETTI, jun. Histological researches and technical observations on tattooing of the cornea with platino-chloride, nitrate of silver, and gold chloride plus silver nitrate.
COSENZA. A case of chronic inflammation and cystic dilation of the Meibomian glands
MAZZOLA. Observations of the capillaries of the edge of the nails in phlyctenular kerato-conjunctivitis.
MARIOTTI. Metastatic abscess of the optic nerve.
RAVERDINO. Protection of the eye during X-ray-radium therapy to the lids.

Revista Oto-Neuro-Oftalmologica. *August, 1929.*

DUSSELDORP. Alterations in the fundus of the eye observed in patients with intracranial hypertension without papilloedema.
HALPHEN, MONBRUM and TOURNAY. Headaches in oto-neuro-ophthalmology (continuation)

Revista Cubana de Oftalmologia y Oto-Rino-Laringologia.

November, 1929.

CASTRESANA. Radium in spring catarrh.
ANDINA. Surgical considerations in the practice of dacryo-cysto-rhinostomy.
YANES. Contribution to the use of a new method of treatment of herpes ophthalmicus.